A new implementation of Dynamic TOPMODEL

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TOPMODEL (Beven and Kirkby 1979)

Key model assumption:

- Water table shape as if quasi-steady recharge for current local discharge allows prediction of saturated areas

- Exponential transmissivity profile leads to topographic index of hydrological similarity, as $\ln(a/\tan(\beta))$

- Suitable only for frequently-wetted catchments with relatively thin soils and moderate slopes
**Dynamic TOPMODEL** (Beven and Freer, 2001)

- How does Dynamic TOPMODEL improve on the original TOPMODEL?
- Extends concept of catchment discretisation
- Limiting storage deficit for downslope flow \( SD_{\text{max}} \)
- Simulates dried upslope areas and variable contributing areas
- Make use of overlays of contributing area, slope, soil type etc in defining response units – use to identify HSUs with catchment-specific features
- New open source coding in R

What have we done so far?

Wye calibration run
Area = 10.5 km²
Observed flows at Cefn Brwyn gauging station (crump weir)

Period: 1/10/77 – 1/4/78

7 HSU groups, discretised according to TWI plus channel network identified from DRN

SRZ_{max}, maximum root zone storage = 0.1 m

ln(T₀), saturated transmissivity = 3 m²/hr

m, decline in transmissivity with depth to water table = 0.005 m

SR_{init}, initial root zone storage = 0 m

T_d, vertical drainage time delay in unsat zone = 20 hr/m

S_{max}, max storage deficit = 3 m
Thank you – questions?

References

Centre for Ecology and Hydrology Information Gateway. Plynlimon DEM and . Downloaded 5/2012 from https://gateway.ceh.ac.uk/